

REMARKSAmendments

In the claims, subject matter from claim 2 has been incorporated into claim 1. Claim 10 has been amended to correct the claim dependency and provide antecedent basis for the printed circuit board assembly. Various minor grammatical errors have been corrected. These amendments have been made solely to more clearly define and recite the present invention and in the interest of rapid prosecution and without prejudice to Applicants' right to prosecute claims of similar or different scope to the unamended claims in one or more continuation applications.

The Rejection Under 35 USC § 102(b)

Applicants respectfully traverse the rejection of claims 1, 2, 5, 9, 11, and 17 under 35 USC § 102(b) as anticipated by Wartenberg et al. (U.S. Patent No. 5,747,147), insofar as the rejection is applicable to the amended claims.

The present claims are directed to a surface mount circuit protection device that includes a laminar PTC resistive element having first and second major surfaces and a thickness therebetween. A first electrode layer substantially coextensive with the first surface is formed of a first metal material of a type adapted to be soldered to a printed circuit substrate. A second electrode layer formed at the second major surface includes structure forming or defining a weld plate. The metal weld plate has a thermal mass and thickness capable of withstanding resistance micro spot welding of a strap interconnect without significant resultant damage to the device, particularly when the thickness of the PTC resistive element comprises a conductive polymer composition that is subject to thermal damage as a result of the high temperatures associated with welding. The claimed device therefore can be soldered using one surface (i.e. the first electrode layer) and welded using the other surface (i.e. the metal weld plate on the second electrode layer). In a preferred use, the device is surface mounted to a printed circuit board assembly forming a battery protection circuit connected to a battery or battery cell by battery strap interconnects, wherein one of the battery strap interconnects is micro spot welded to the weld plate of the device.

Wartenberg et al. discloses a circuit protection device in which a conductive polymer is positioned between two metal foil electrodes. Wartenberg discloses that metal leads or thermal control elements, e.g. metal terminals, can be attached either directly or by means of an

intermediate layer, e.g. solder or conductive adhesive, to the foil electrodes (and not to a printed circuit board). There is in Wartenberg no teaching that a surface mount circuit protection device should or could have a first electrode layer that is solderable to a printed circuit board and a second electrode layer attached to a weld plate that is capable of withstanding resistance micro spot welding of a strap interconnect means without significant resultant damage to the device. Wartenberg merely teaches that metal leads or thermal control elements can be used. In fact, the detailed description of Examples 1 to 7 discloses attachment of tin-coated copper leads to each metal foil by means of solder (column 6, lines 49-53). There is no teaching of the use of Wartenberg's devices to achieve both solderability to a circuit board and weldability to a strap interconnect.

The Rejection Under 35 USC § 103(a)

Applicants respectfully traverse the rejection of claims 3, 4, 6-8, 10, 12-16, and 18-20 under 35 USC § 103(a) as unpatentable over Wartenberg et al. (U.S. Patent No. 5,747,147) in view of Banich et al. (U.S. Patent No. 6,104,587), insofar as the rejection is applicable to the amended claims.

The deficiencies of Wartenberg noted above are not resolved by the addition of Banich et al. Banich discloses an electrical device in which a PTC resistive element composed of a conductive polymer composition is sandwiched between two metal foil electrodes, at least one of which has a thickness of at least 0.055 mm. The ratio of the thickness of the resistive element to the electrode thickness is 1:1 to 16:1. Like Wartenberg, Banich does not disclose a device in which there is a first electrode layer that is solderable to a printed circuit board and a second electrode layer attached to a weld plate that is capable of withstanding resistance micro spot welding.

Concerning claims 3, 4, 15 and 20: although the Examiner has stated that Banich discloses a weld plate comprising nickel (i.e. Banich element 75), the element identified by Banich as a weld plate is not, in fact, a weld plate or the equivalent of a weld plate. Element 75 is the base layer of one of the electrodes (second electrode 7) as disclosed in Banich (column 6, lines 46-55).

Concerning claims 6 and 16, the Examiner contends that Banich discloses a weld plate (75) that includes a raised central mesa region and an insulated box 13 surrounding the outer edges of the device and defining an opening exposing the central mesa region 75. Figure 2 of

Banich shows a device in which metal leads 9,11 are attached to the surface of first and second electrodes 5,7 respectively. An insulating layer 13, e.g. an epoxy layer, covers the resistive element and the first and second electrodes, as well as part of the metal leads. The presence of this insulating layer teaches directly away from the present claims in that since the first electrode is covered, it cannot be surface mounted by solder to a printed circuit, and there is no opening exposing the central mesa region in the region in which a weld would damage the PTC resistive element.

Banich provides preferred thickness dimensions for the at least one electrode (column 4, line 65 to column 5, line 7) . However, in contrast to the Examiner's contention concerning claims 7, 8, 12, and 19, this at least one electrode is not the equivalent of Applicants' weld plate as it is not formed separately of and extending from the second electrode. A similar argument applies to the Examiner's comment concerning claims 13 and 14 which refer to the thicknesses of the weld plate and the strap interconnect means. Since Banich does not provide a weld plate, there is no teaching or suggestion of preferred dimensions for such elements.

Claim 10 recites a device surface mounted in a printed circuit board assembly and connected to a battery by strap interconnects by micro spot welding to the weld plate means. Banich merely discloses that a circuit protection device can be inserted onto a battery terminal, and that electrical connection for most applications is done by means of electrical leads that must be soldered or welded onto the electrodes. There is no teaching or suggestion in Banich of the specific device recited in claim 10, in which the device is surface mounted by soldering and then welded to a battery strap interconnect by means of a weld plate means. Similar comments apply to claim 18 which recites that the assembly comprises a lithium polymer cell having first and second terminal tabs wherein the first tab comprises strap interconnect means being micro spot welded to the weld plate or the second tab being connected to circuitry of the printed circuit substrate. Banich does not teach anything about a lithium polymer cell having terminal tabs that are connected in the way recited in the present claims. As a result, these objections are unfounded.

Disclosure Under 37 CFR § 1.56

In fulfilling the duty of candor and good faith, the following documents are hereby disclosed to the Patent Office in accordance with 37 CFR § 1.56. It is not admitted that the information in the listed documents is material to patentability as defined in 37 CFR § 1.56(b). The Examiner is requested to consider the documents in the examination of this application.

Accompanying this statement are Forms PTO/SB/08A and PTO/SB/08B in duplicate on which the documents are listed. The Examiner is requested to return an initialed and signed copy of the forms once the documents have been considered.

The following documents were cited by the European Patent Office in the European Search Report for European Application No. EP 05101981 which is a counterpart for this application. Two documents were cited in category "X" as documents "particularly relevant if taken alone"; the remaining documents were cited in category "A" as documents of "technological background". A copy of the Search Report, sent in a communication from the European Patent Office dated April 25, 2007, is attached.

U.S. PATENT DOCUMENTS

Document Number	Publication Date	Name of Patentee or Applicant	Category
US-2003/026053-A1	02-06-2003	Toth et al. (Tyco Electronics)	A

FOREIGN PATENT DOCUMENTS

Document Number	Publication Date	Name of Patentee or Applicant	Translation	Category
JP-10-289780-A	10-27-1998	Nakano (Nippon Tungsten)	Abstract	X
WO-01/86664-A	11-15-2001	Lutz et al. (Epcos AG)	Abstract	X
WO-03/010848-A	02-06-2003	Kim et al. (Korea Power Cell Inc.)	N/A	A
EP-1119060-A	07-25-2001	Abe (Sony Corporation)	N/A	A

The following documents are referred to in the specification. (Also cited in the specification are two documents listed on the Form PTO-892, which accompanied the Office Action mailed June 25, 2007. Those two documents are U.S. Patents Nos. 5,436,609 (Chan et al.) and 5,747,147 (Wartenberg et al.).)

U.S. PATENT DOCUMENTS

Document Number	Publication Date	Name of Patentee or Applicant
US-4,237,441	12-02-1980	van Konynenburg et al.
US-4,304,987	12-08-1981	van Konynenburg
US-4,514,620	04-30-1985	Cheng et al.

US-4,534,889	08-13-1985	van Konnenburg et al.
US-4,545,926	10-08-1985	Fouts et al.
US-4,689,475	08-25-1987	Matthiesen
US-4,724,417	02-09-1988	Au et al.
US-4,774,024	09-27-1988	Deep et al.
US-4,800,253	01-24-1989	Kleiner et al.
US-4,935,156	06-19-1990	van Konnenburg et al.
US-5,049,850	09-17-1991	Evans et al.
US-5,089,801	02-19-1992	Chan et al.
US-5,378,407	01-03-1995	Chandler et al.
US-5,451,919	09-19-1995	Chu et al.
US-5,582,770	12-10-1996	Chu et al.
US-5,801,612	09-01-1998	Chandler et al.
US-5,874,885	02-23-1999	Chandler et al.
US-6,130,597	10-10-2000	Toth et al.
US-6,358,438	03-19-2002	Isozaki et al.
US-6,362,721	03-26-2002	Chen et al.
US-6,518,731	02-11-2003	Thomas et al.
US-6,570,483	05-27-2003	Chandler et al.
US-2003/0026053-A1	02-06-2003	Toth et al.

FOREIGN PATENT DOCUMENTS

Document Number	Publication Date	Name of Patentee or Applicant	Translation
WO-99/60637-A1*	11-25-1999	Sato et al. (K.K. Raychem)	Abstract

* counterpart of U.S. Patent No. 6,713,210 (Sato et al., issued March 30, 2004)

Copies of Documents

In accordance with 37 CFR §1.98(a)(2), copies of the foreign patents and patent publications and documents listed above are enclosed. Copies of the listed U.S. patents and patent publications are not being submitted, although copies will be sent on request.

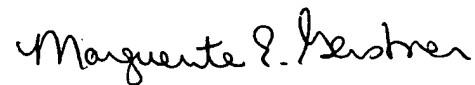
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In accordance with 37 CFR § 1.97(c)(2), the Commissioner is authorized to charge the fee for submitting this Information Disclosure Statement (\$180) to Deposit Account No. 18-0560.

Conclusion

It is believed that this application is now in condition for allowance and such action at an early date is earnestly requested. If, however, there are any outstanding issues which can be usefully discussed by telephone, the Examiner is asked to call the undersigned.

Respectfully submitted,



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